

User Manual
Portamesse® 913 Cond and
Portamesse® 913 X Cond

Knick >

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

Sensors and accessories: 1 year.

Subject to change without notice.

Return of products

Please contact our Service Team. Ship the cleaned device to the address you have been given.

If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.



Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

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Safety Precautions

Be sure to read and follow these instructions!



If you have to open the Portamesse® 913 X Cond to change the batteries, make sure that it is outside the hazardous area. If repairs are necessary, the meter must be sent in to the factory.

Never operate the remote interface or printer within a hazardous area.

Whenever it is likely that the protection has been impaired, the meter shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:

- the meter shows visible damage
- the meter fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stresses

Before recommissioning the meter, a professional routine test shall be performed. This test should be carried out at our factory.

Additional safety notes for ATEX

The Portamess® Type 91. X Cond portable conductivity meter has been designed and manufactured under consideration of the valid European standards and regulations and is suitable for use in areas with an explosion hazard.

Compliance with the European Harmonized Standards for use in hazardous locations is confirmed by the Declaration of Conformity, the EC-Type-Examination Certificate and the Statement of Conformity / Validity of the EC-Type-Examination Certificate. These are included in the user manual.

When using the Portamess® Type 91. X Cond portable conductivity meter, the conditions of EN 60079-14 "Electrical systems in hazardous areas" must be observed.

Prerequisite to safe use of the equipment is the observance of the specified ambient conditions and temperature ranges.

Never open the meter inside a hazardous area.

Warning



For applications in hazardous locations, only use the battery types listed in the table below.

The batteries must be from the same manufacturer and of identical type and capacity.

Never use new and used batteries together.

Batteries for applications in hazardous locations

Batteries (3 x each)	Temp. class	Ambient temperature range
Duracell MN1500	T4	$-10\text{ °C} \leq T_a \leq +40\text{ °C}$
Energizer E91	T3	$-10\text{ °C} \leq T_a \leq +50\text{ °C}$
Power One 4106	T3	$-10\text{ °C} \leq T_a \leq +50\text{ °C}$
Panasonic Pro Power LR6	T3	$-10\text{ °C} \leq T_a \leq +50\text{ °C}$

The batteries listed in the table are used instead of the Varta batteries Type 4006, Type 8006 and Type 3706 listed in the EC-Type-Examination Certificate. These batteries were tested according to IEC 60079-0:2007, IEC 60079-11:2006 by a notified body and the test results were set out in an IECEx test report.

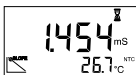
Equipped with the batteries listed in the table, the Model 91. X Cond portable conductivity meter may be used in hazardous areas.

Be sure to observe the temperature classes and ambient temperature ranges listed in the table for the different battery types.

Conventions Used in this Manual

ITALICS are used for texts which appear in the Portamess® 913 (X) Cond display.

Bold print is used to represent the texts of keys, e.g. **cal**.



Display examples

or



keys whose functions are explained are frequently shown in the left-hand column.

Note



Notes provide important information which should always be observed when using the meter.

Caution



Caution means that the instructions given must always be followed to prevent malfunctions or damage to the device.

Warning



Warning means that the instructions given must always be followed for your own safety. Failure to follow these instructions may result in injuries.

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1 The Model 913 (X) Cond

Package contents

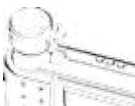


Please check the completeness of the shipment after unpacking.

The package should include:

- Portamess® 913 (X) Cond incl. batteries and sensor container
- Carrying strap
- User manual
- Quickstart instructions in German, English and French
- Interface cable with adapter for printer and PC
- Paraly® transfer software

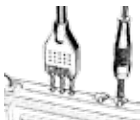
Intended use / Short description



- The Portamess® 913 (X) Cond measures conductivity, salinity, TDS and temperature in industry, the environment, food processing and waste-water treatment.
- Operation of the Portamess® 913 X Cond is also permitted in hazardous areas Zone 1.
- The meter meets the EMC requirements of 89/336/EEC and the recommendations as per NAMUR NE 21.
- The meter is IP 66 protected to EN 60 529 (jet water from all directions).
- Temperature compensation is automatic with an NTC 30 k Ω or a Pt 1000 temperature detector (automatic recognition during power-on). When using sensors without a temperature detector, the temperature can be manually specified.
- Calibration can be carried out by directly entering the cell constant, by calibrating with KCl 0.01 mol/l or 0.1 mol/l solutions or with any other calibration solutions.



- The data logger records up to 100 measured values with the temperature, date and time. Recording can be done either manually, interval or event-controlled.
- To minimize battery consumption, the meter switches off automatically when it is not operated for either one hour or twelve hours.
- Only three alkaline AA batteries are required for uninterrupted operation for approx. 1,000 hours.
- With the Paraly® software, the meter can be completely remote-controlled from a PC. All measured values and parameters can be read out and easily processed further (e.g. using Microsoft Excel).
- Measured values and meter records can also be output directly to a printer via the serial interface.



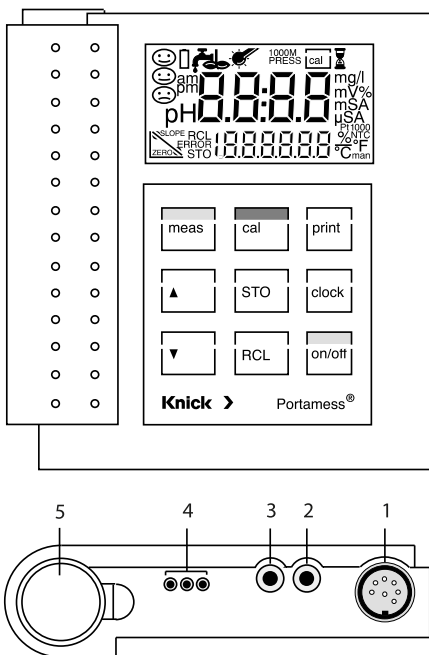
Caution



Never use the remote interface in hazardous areas!

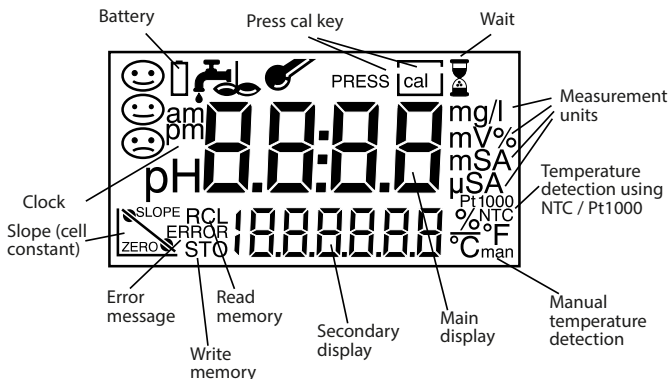
2 Operation

Meter design



- 1 Sensor connection
- 2,3 Separate temperature probe connection
- 4 PC/printer interface connection
- 5 Sensor container, removable

Display



Keypad



Pressing **on/off** switches the meter on or off.

After power-on, the meter automatically carries out a self-test and adjusts itself to the connected temperature detector.



Pressing **meas** returns the meter to the measuring mode from any function. Pressing **meas** in the measuring mode displays the following parameters:

Cond measuring mode: temperature compensation
tDS measuring mode: TDS factor

Note



You can also switch the meter on by pressing **meas**. However, in this case only a short test is performed and the temperature detector is not identified. The meter assumes that the last temperature detector identified is used.



Pressing **cal** starts calibration.



With ▲ and ▼ you can select and change parameters and select a mode.



Pressing **clock** switches the meter into the clock mode. All measurement processes are canceled and the battery consumption is reduced to a minimum.



Pressing **STO** records the measured value in the display and stores it in the data memory.



Pressing **RCL** displays stored measured values.



Pressing **print** outputs the currently measured value to a printer or PC.



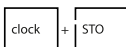
Pressing **RCL** and then **print** prints out the data memory.



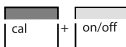
Pressing **cal** and then **print** prints out the meter record.



Pressing **STO** and then **clock** switches the meter into the data logger mode.



Pressing **clock** and **STO** simultaneously activates the mode for setting the date and time.



Pressing **cal** and **on/off** simultaneously when the meter is switched off, opens the configuration menu.

Note



When pressing two keys simultaneously, make sure that the key shown at the left is pressed first.

Connection and start-up

Sensor connection

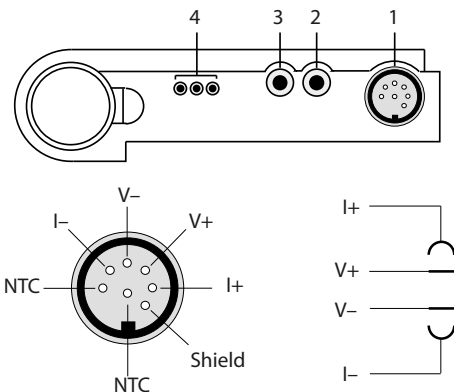
The following sensors from the line of accessories can be connected to the meter.

SE 202 2-electrode sensor with integrated NTC 30 k Ω temperature detector

SE 204 4-electrode sensor with integrated NTC 30 k Ω temperature detector

Connection assignment

Connection	Socket
Sensor	1
Separate temperature probe	2, 3
Remote interface	4



If no temperature detector is used for measurement, the meter operates with the manually set temperature and *man* appears in the display.

Note



When using a sensor with integrated temperature detector, do not connect an external temperature probe.

Note

If the meter is connected to a PC and is used to take measurements in a grounded liquid, measuring errors may result.

Note

Prior to first use, the cell constant, temperature compensation and time and date must be checked and set, if required. The cell constant is printed on the sensor head and listed in the sensor specifications (see also page 37).

Note

The calibration and configuration data remain permanently stored both with the meter switched off and with the batteries removed (battery replacement).

Start-up

Pressing **on/off** switches the meter into measuring mode. After power-on, the meter determines the connected temperature detector and performs a self test:

- Simultaneous appearance of all display segments
- Display of the model number
- Display of the software version

Note

For recognition of the temperature detector, the conductivity sensor must be connected to the meter before power-on. The temperature detector is only recognized during the power-on procedure after pressing **on/off**.

Note

The meter can also be switched on with **meas**. However, in this case only a short test is performed and the temperature detector is not identified. The meter assumes that the last temperature detector identified is used.

Note

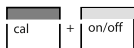
The SE 202 and SE 204 sensors have an integrated NTC temperature detector.

Configuration

The following basic settings can be changed in the configuration:

Function: *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids or evaporation residue)

- Calibration by entering the cell constant (*AutCAL Off*) or calibration with calibration solution (*AutCAL On*)
- Automatic meter switch-off after 1 hour or 12 hours
- Interface: Printer output On/Off, baud rate
- Temperature display °C or °F
- Date and time format 24 hours and day, month, year or 12 hours (a.m./p.m.) and month, day, year



To activate the configuration, hold down **cal** with the meter switched off and then press **on/off**.

Conf

The menu items of the configuration menu are worked through in sequence. Use ▲ and ▼ to change the setting of the respective menu item. **STO** saves the parameters and switches to the next menu item.



Pressing **meas** exits the configuration menu at any time. The value last displayed and possibly changed will then not be saved.

Function

Select the measuring function: *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids or evaporation residue).

Automatic or manual calibration

Select whether you wish to adapt the sensor by directly entering the cell constant or by calibrating with a calibration solution and automatic drift check.

(Default setting: Direct entry of the cell constant (*AutCAL OFF*))

OFF
AutCAL

Direct entry of the cell constant (*AutCAL OFF*) from 0.010 cm^{-1} to 199.9 cm^{-1} . (Default setting 0.475 cm^{-1})

On
AutCAL

Automatic calibration (*AutCAL On*) with 0.1 molar KCl solution, 0.01 molar KCl solution or entry of the temperature-compensated conductivity of another known calibration solution.

Automatic switch-off

To protect the batteries, the meter switches off automatically when not operated for a longer time.

1 h
AutoOFF

You can select whether switch-off is to take place after one hour or after twelve hours (default setting: 1 hour). If the data logger is active and during remote interface operation, the auto switch-off feature is disabled.

Interface

On
Print

If the meter is controlled by a PC and interface conflicts occur when the **print** key is pressed, you should deactivate the print function (*Print OFF*) (default setting: Print On, 4,800 bauds).

4800
baud

The transmission speed can be set to 600, 1200, 2400, 4800 or 9600 bauds. The transmission speed must correspond to that set in the printer or PC. Data format and protocol are permanently set to 7 bits, one stop bit, even parity and XON/XOFF protocol (NAMUR NE28).

Temperature display

0°C
TEMP

The temperature can be displayed either in °C or °F (default setting: °C).

Date and time format

You can choose between the display format 24 hours and day.month.year and the format 12 hours a.m./p.m. and month.day.year.
(Default setting: 24 hours and day.month.year)

24:00
DATE

Calibration

By calibration, the Portamess® 913 (X) Cond is adjusted to the cell constant of the sensor.

It is generally sufficient to enter the cell constant specified by the sensor manufacturer.

General information on calibration

Calibration solutions Solutions for calibration of conductivity measuring devices are unbuffered systems. Care should be taken to use fresh conductivity standards and to avoid contamination of the conductivity standard by water droplets adhering to the conductivity sensor.

Clean sensors Before calibration, make sure that the conductivity sensor is clean. Residues should be rinsed off with distilled water. Afterwards, the sensor should be wiped dry and rinsed with the calibration solution to be used.

Cell constant The cell constant is determined by the size and geometric arrangement of the measuring electrodes. It is the characteristic parameter of conductivity sensors. The cell constant changes very little over time. The prerequisite is clean electrode surfaces without insulating deposits. Regular calibration is therefore generally not necessary.

4-electrode sensors With 4-electrode sensors the principle of separate current/voltage electrodes results in virtually no measuring errors even in the case of partial soiling of the measuring electrodes. However, electrodes completely soiled with insulating coatings cause the measurement to fail.

2-electrode sensors With 2-electrode sensors for the measurement of low conductivities, e.g. ultrapure water, no calibration with calibration solutions is possible in practice, as calibration solutions with a correspondingly low conductivity do not have a stable conductivity value. The use of calibration solutions with a higher conductivity ($> 200 \text{ S/cm}$) would lead to considerable polarization errors. Therefore, the cell constant must be entered manually when using 2-electrode sensors.

**SE 202 and
SE 204 sensors**

For the conductivity sensor models SE 202 and SE 204, the cell constant is specified with a tolerance of 2 % and 1.5 %. This cell constant is entered and stored in the calibration mode (*AutCAL OFF*). An additional calibration with calibration solutions is not necessary.

Calibration by direct entry of the cell constant (*AutCAL OFF*)

SE 202 sensor: $c = 0.1 \text{ cm}^{-1}$

SE 204 sensor: $c = 0.475 \text{ cm}^{-1}$



Press **cal** to activate calibration. The cell constant determined or set during the last calibration is displayed. Pressing **meas** exits calibration again.



Use ▲ and ▼ to set the cell constant of the sensor and confirm by pressing **cal**. The meter will then switch back to the measuring mode.

Calibration with 0.1 or 0.01 molar KCl solution (AutCAL On)

Note



Impurities must always be prevented from getting into the calibration solutions.



Pressing **cal** activates calibration.

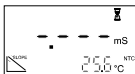
Calibration can be exited again by pressing **meas**. Then, the cell constant of the last calibration is displayed briefly.



Select the calibration solution used (*CAL SOL*). A 0.1 and a 0.01 molar KCl solution are available to choose from. Press **cal** to confirm the corresponding solution.

Immerse the clean and dry sensor in the calibration solution (see also "Clean sensors", page 19).

Press **cal** to start calibration. If calibration is not desired, cancel the process by pressing **meas**.



During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hourglass indicator flashes.



When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

Confirm by pressing **cal**.



The determined cell constant is displayed for a few seconds. Then, the meter switches back into the measuring mode.

Calibration with any calibration solution (AutCAL On)

Note



Impurities must always be prevented from getting into the calibration solutions.



Pressing **cal** activates calibration.

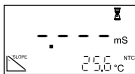
Calibration can be exited again by pressing **meas**. Then, the cell constant of the last calibration is displayed briefly.



First confirm any of the 0.1 or 0.01 mol/l KCl solutions (CALSoL) by pressing **cal**.

Immerse the clean and dry sensor in the calibration solution (see also "Clean sensors", page 19).

Press **cal** to start calibration. If calibration is not desired, cancel the process by pressing **meas**.



During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hourglass indicator flashes.



When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

See the table of your calibration solution for the conductivity value which belongs to the displayed measuring temperature.

Set the temperature-compensated conductivity in the meter using ▲ and ▼, then confirm it by pressing **cal**.



The determined cell constant is displayed for a few seconds. Then, the meter switches back into the measuring mode.

Measurement

Measuring mode

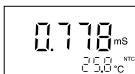
Pressing **meas** accesses the measuring mode from all functions. In the measuring mode, the main display indicates the measured variable and the secondary display shows the temperature.

Note



If the Portamess® 913 (X) Cond is connected to a PC and measurements are taken in a grounded liquid, measuring errors may result.

Measuring the conductivity (Cond)



The main display indicates the measured conductivity, the secondary display shows the temperature.

Temperature compensation

The meter offers various temperature compensation methods. With **meas** and ▲ or ▼, the temperature compensation method can be selected and set:



(*tc OFF*) No temperature compensation



(*tc nLF*) Temperature compensation with non-linear characteristic to EN 27088 for natural water and ultrapure water (reference temperature 25 °C). In the secondary display *tc* also appears.



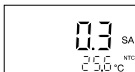
(*tc 0.01 – 9.99 %/°C*) Temperature compensation with linear characteristic and definable temperature coefficients (reference temperature 25 °C). In the secondary display *tc* also appears.

Note



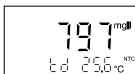
When you have selected temperature compensation with linear characteristic, you can only exit this function or select the nonlinear function when the temperature coefficient has been set to 0.00.

Measuring the salinity (SAL)



The main display indicates the measured salinity in ‰ (g/kg), the secondary display shows the temperature.

TDS determination (TDS)



The main display indicates the concentration of the dissolved solids contributing to the solution conductivity (TDS, comparable to the evaporation residue) in mg/l, the secondary display the temperature.

TDS factor

Pressing meas and then ▲ or ▼ sets the TDS factor within the range 0.40 – 1.00.

Note

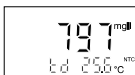


The TDS factor depends on the composition of the water to be tested and must be determined for each water type.

Manual temperature specification

The *man* display signals that no temperature detector is connected. The meter operates with the manually specified temperature. The specified temperature can be edited with the ▲ and ▼ keys in the *Cond* measuring mode.

Data memory



Up to one hundred measured values can be saved in the data memory together with the temperature, date and time. Storage is performed either manually or automatically using the data logger. The currently measured value is stored.

Write memory

Press **STO**.
The currently measured value is shown in the display.



Select any memory location with **▲** and **▼**.
Press **STO** to store the measured value in the selected memory location



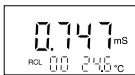
After storing, the memory location number is automatically incremented and the meter returns to measuring mode.

Read memory

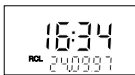
Pressing **RCL** displays the last stored value.



Select any memory location using **▲** and **▼**.
Pressing **RCL** switches between the measured value and the time/date of storage.



This allows, for example, searching for a value that was stored at a certain time.



Pressing **meas** returns to the measuring mode.

Clear memory

To clear the entire data memory, press **STO** to access the memory mode and then press **clock** to access the data logger mode.



Here, select Clear (**CLr**) using **▲** or **▼**.

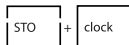


By confirming this with **STO**, the entire data memory is cleared.

If you do not want to clear the memory, press **meas** to cancel.

Data logger

Data logger The data logger records up to 100 measured values together with temperature, time and date. Data storage is performed either manually (at the press of a key), interval- or event-controlled. The data logger always saves the currently measured variable.



Press **STO** to access the memory mode and then **clock** to access the data logger mode. The currently measured value is shown in the display.



Pressing **STO** confirms the selected mode. In the Continue and Start mode this also starts the data logger. The current memory location is shown in the display. If "Clear" has been selected, all memory locations are cleared and the meter returns to measuring mode.



Pressing **meas** ends the data logger mode.

Data logging modes



After pressing **STO**, logging is continued after the memory location in which the last measured value was stored (continue). Press **meas** to exit logging.



After pressing **STO**, the entire data memory is cleared without starting the data logger (clear).



After pressing **STO**, the entire data memory is cleared. Storage begins from memory location "00" (start). Press **meas** to exit logging.

Setting the data logger parameters

PAR
LOGGER

In the parameter setting mode, you select whether data logging is to be interval-controlled, event-controlled or manual. Press **STO** to access the logging functions.

Int
LOGGER

To select interval-controlled logging of measured values, press **STO** and set the interval in which the recording is to take place using **▲** and **▼**. The interval range is between 5 seconds and 60 minutes. Default time (factory-set) is 2 minutes. After selecting your interval time, press **STO** to enter the value.

dIFF
LOGGER

With event-controlled data logging, a measured value is not saved until it deviates from the last memory value by the preset differential value. Using the time which is also stored, you can determine when the value has changed. The differential value is entered in the subsequent parameter-setting step.

Note



The differential value is always based on the currently set measured variable (conductivity, salinity or TDS). This means that if differential conductivity values are to be logged, the meter must be set to conductivity measurement prior to parameter setting and data logging.

Shot
LOGGER

With manual data logging, the measured values are saved by pressing **STO**.

STO

After selecting the above parameters, select "Continue" or "Start" using the **▲** and **▼** keys and then press **STO** to commence logging.

Note



The data logger is a ring memory, i.e. it does not stop after reaching the last memory location (99). Recording is automatically continued with memory location number 00. To avoid losing data by overwriting, download stored data and clear the logger before beginning a new set of data. Be aware of this when using interval-controlled data logging.

Clock mode

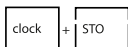


Pressing **clock** exits the measuring mode, or enters the clock mode with the meter switched off. The time and date are displayed.

In this mode the battery consumption of the meter is reduced to a minimum.

Setting clock

To set the time or date, the clock mode must be activated.



Press **clock** and **STO** simultaneously.

A digital display showing the time "10:48".

The time display flashes.

Now, the time can be set using ▲ and ▼.

A digital display showing "DATE" in large letters and "25.06." below it.

Pressing **STO** again saves the displayed time.

Now, the date can be set.

A digital display showing "YEAR" in large letters and "1997" below it.

Press **STO** again to save the date. Now, the year can be set.

Press **STO** to confirm the year. The meter returns to the clock mode.



Press **meas** to return to measuring mode.

Serial interface

Note



If the meter is connected to a PC and measurements are taken in a grounded liquid, measuring errors may result.

With the remote interface, you can directly send data to a printer with serial port or set up a direct connection to a personal computer. Via the computer, the meter can be completely remote controlled and all data and parameters can be read. Using the printer (e.g. printer ZU 0244), you can directly print measured values, the memory and records.

Interface parameters

The RS 232 interface can be defined for all common baud rates.

Setting is carried out in the Configuration menu

- Baud rate: 600 Bd
1,200 Bd
2,400 Bd
4,800 Bd (default setting)
9,600 Bd

The data format and protocol are permanently set to:

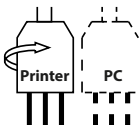
- 7 bits
- even parity
- one stop bit
- XON/XOFF protocol

Note



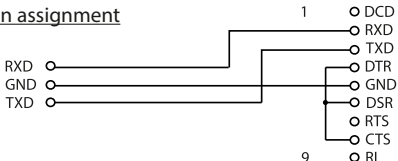
For the command set of the Portames[®] 913 (X) Cond, refer to the online help of the Paraly[®] transfer software.

Interface cable



Only one interface cable is required to operate with a printer or PC. By simply turning the plug around on the meter's interface port, the cable can be used to connect either printer or PC. The label facing the operator should match the output device being connected.

Connection assignment



Standard settings for ZU 0244 Lab Printer

Meter configuration	Parameter	Setting
	Baud rate	4800
	Printer	On

Printing measured values and records

Note



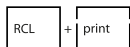
Make sure that the printer function is activated in the configuration (*Print On*) and the set baud rate corresponds to that of the printer.

Printing measured values



Press **print** while in the measuring mode to print out the currently measured value. The measured value is printed out together with the temperature, date, time and a three digit identification number. The identification number is reset when the meter is switched off.

Printing the memory



Press **RCL** and then **print** to print out the stored data. All stored measured values are printed with temperature, date, time and memory location number. If you only want to print individual memory locations, press **RCL**. Then select the desired memory location using **▲** or **▼**. Press **print** to start printing.

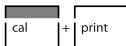
Note



If the permissible measurement or temperature range has been exceeded during data logging or if the clock has not been set, the line on the printout will be marked with "#". If temperature compensation was active during data logging, the line on the printout will be marked with "!".

Printing the record

To print out the meter record, press **cal** and then **print**. The record printout contains:



- a calibration record with the data of the last calibration
- the settings of the configuration menu
- a record of the last meter self-test

3 Troubleshooting

Error messages

Range limits exceeded If a measured value lies outside the ranges accepted by the meter, an error message appears and the measured-value display flashes.

ERROR 1 The measurement range was exceeded.

Possible causes:

- Sensor defective
- Break in sensor cable
- Wrong sensor connected
- Wrong cell constant entered

ERROR 3 The measured temperature is outside the ranges:

Conductivity: $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$

nLF: $0\text{ }^{\circ}\text{C}$ to $120\text{ }^{\circ}\text{C}$

Salinity: $0\text{ }^{\circ}\text{C}$ to $30\text{ }^{\circ}\text{C}$

TDS: $10\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$

Possible causes:

- Temperature detector in the sensor defective
- Short circuit in temperature detector
- Wrong temperature detector connected

Note When changing the conductivity sensor, note that the temperature detector type (Pt 1000/NTC 30 k Ω) is only recognized when the meter is switched on with **on/off**.



Calibration error messages If errors occur during calibration, or if the determined sensor data are outside the valid range, an error message appears (*ERROR 6*, *ERROR 11*).

ERROR 6 The cell constant lies outside the permissible range $< 0.01 \text{ cm}^{-1}$ or $> 199.9 \text{ cm}^{-1}$.

Possible causes:

- No sensor connected during calibration
- Wrong calibration solution
- Sensor not immersed far enough in calibration solution

ERROR 11 The calibration was canceled after approx. 2 minutes, because the drift was too large. This message only appears briefly during calibration.

Possible causes:

- Sensor defective or dirty
- Sensor cable insufficiently shielded or defective
- Strong electric fields influence the measurement
- Major temperature fluctuation of the calibration solution
- Calibration solution unstable
- Conductive connection between potential to ground, PC, meter and measured medium

ERROR 14 If the clock has not been set, e.g. after battery replacement, this error message is displayed. To clear the message, set the clock (see page 28).

ERROR 15 If errors occur during transmission via the RS 232 interface, this error message appears.

To eliminate the error message, switch the meter off and then on again. Should the error message occur again, check the settings in the Configuration menu.

Possible causes:

- Wrong transmission rate (baud rate) set (see page 17)
- Error during transmission
- Wrong data format (see page 17), e.g. parity bit

ERROR 18 If the meter detects an error during the self-test, an error message appears.

Possible causes:

- Configuration or calibration data are defective.
Completely reconfigure and recalibrate the meter.

ERROR 19 Error in the factory settings or system memory.
FAIL appears in the display.

FAIL Possible causes:

- EPROM or RAM defective
- Error in meter factory settings

Note



This error message should normally not occur, as the data are protected from loss with multiple safety functions. Should this error message nevertheless appear, no remedy is available. The meter must be repaired and recalibrated at the factory.

4 Maintenance

Changing the batteries



When the battery symbol appears in the display, the batteries need replacement. However, the meter can still be used for a few days. When the battery voltage continues to drop, the meter will switch itself off.



Never change the batteries within a hazardous area. Use only the batteries specified on page 5. Make sure that the meter is carefully closed again and that the protective cover is properly mounted on the meter after changing the batteries (see also "Additional safety notes for ATEX", page 4).

To replace the batteries, you need 3 alkaline AA cells and a screwdriver (either straight-blade or Phillips).

- Close the protective cover and remove the sensor container.
- Lift the hook, unscrew the four screws on the back of the meter and remove the lid.
- Remove the old batteries from the battery holder.
- Insert the new batteries in the specified direction.
- Make sure the protective cover is in the notches provided and the rubber seal is correctly seated, especially near the sensor socket.
- Remount the lid and secure it with the screws. Be sure to tighten the screws thoroughly.
- Remount the sensor container.

Note



When changing the batteries, all calibration and configuration data are retained. The time and date must be reset. The current memory location number of the measured-value memory is set to 00.

Note

After battery replacement recording will also be continued with memory location 00 when the meter is in the data logger "Continue" mode. If you have stored measured values before battery replacement and you do not want to overwrite them, set the first memory location to be written with **RCL** and **▲** or **▼** before restarting the data logger.

Caution

If you want to store the meter for a longer time, the batteries must always be removed beforehand. Leaky batteries may damage the meter.

Cleaning the meter

To remove dust and dirt, the external surfaces of the meter may be cleaned with water, and also with a mild household cleaner if necessary.

Caution

Beware of electrostatic charging when using the meter in hazardous areas!
For example, never wipe the meter with a dry cloth.

Appendix

Accessories

		Ref. No.
	Printer	ZU 0244
	Printer paper (5 rolls)	ZU 0249
	Printer ribbon (5 units)	ZU 0250
	Sensor container, 5 units (for leak-proof storage of the sensors)	ZU 0262
	Replacement flow-through cell for SE 202 2-electrode sensor	ZU 0284
	Adapter for 2-pole banana plug to meter socket	ZU 0289
	Adapter for 8-pole plug to meter socket for connection of ZU 6985 lab sensor	ZU 0290
Sensors	2-electrode sensor incl. flow-through cell Material: stainless steel 1.4571 Cell constant: 0.100 cm^{-1} Range: $0.01 - 199.9 \mu\text{S/cm}$	SE 202
	4-electrode sensor Material: epoxy/graphite Cell constant: 0.475 cm^{-1} Range: $0.1 \mu\text{S/cm} - 500 \text{ mS/cm}$	SE 204
Conductivity standards	13.88 mS /cm, 250 ml (0.1 mol/l KCl)	ZU 0348
	1413 $\mu\text{S/cm}$, 250 ml (0.01 mol/l KCl)	ZU 0349
	15 $\mu\text{S/cm}$, 300 ml	ZU 0350

Specifications for Portamess® 913 (X) Cond

Ranges	Conductivity:	0.1 $\mu\text{S}/\text{cm}$ to 1,000 mS/cm ($c > 0.8 \text{ cm}^{-1}$) 0.1 $\mu\text{S}/\text{cm}$ to 500 mS/cm ($c = 0.2$ to 0.8 cm^{-1}) 0.01 $\mu\text{S}/\text{cm}$ to 199.9 $\mu\text{S}/\text{cm}$ ($c < 0.2 \text{ cm}^{-1}$)
	Temperature:	-20.0 to +120.0 °C / -4 to 248 °F nLF: 0 to 120 °C
	Salinity:	0.0 to 45.0 g/kg (0 to 30°C)
	TDS:	0 to 1,999 mg/l (10 to 40°C)
Display	LCD 35 x 67 mm, character height 15 mm	
Measurement cycle	Approx. 2 sec	
Measurement error (± 1 count)	Conductivity:	< 0.5 % of measured value ¹⁾
	Temperature:	< 0.3 K
Input 1 (Sensor)	Multi-contact for 2 and 4-electrode sensors with integrated temperature detector	
Input 2 (Temperature)	4-mm sockets for separate Pt 1000 / NTC (30 k Ω) temperature detector	
Permissible cell constant	0.010 to 199.9 cm^{-1} (adjustable)	
Sensor standardization	Direct entry of the cell constants, Automatic determination of the cell constants with KCl solution 0.01 mol/l or 0.1 mol/l, Sensor standardization with any known solutions	
Meter self-test	During switch-on routine, segment test, display of model number and software version	
Temperature measurement	Pt 1000 / NTC 30 k Ω (automatic recognition during power-on) or manual temperature entry	
Temperature compensation	Linear characteristic: 0.01 to 9.99 %/°C nLF (non-linear characteristic for ultrapure water and natural water to EN 27088)	
Data memory	100 memory locations: conductivity, salinity or TDS, with temperature, date and time	
Data logger	Manual, interval-controlled or event-controlled	

¹⁾ For conductivities > 500 mS/cm : < 1% meas. value

Remote interface	Serial RS 232 interface, bidirectional, asynchronous, baud rate user-defined (600 to 9,600 baud), can be used as either printer or computer interface	
Data retention	Configuration/calibration data and factory settings >10 years	
Automatic switch-off	After either 1 or 12 hours, ineffective during interface or data logger operation	
EMC	Emitted interference: EN 61 326 Class B Immunity to interference: EN 61 326, EN 61 326/A1 and NAMUR NE 21	
Explosion protection (913 X Cond only)	II 2(1)G Ex ia IIC T3/T4 Ga, PTB 01 ATEX 2161	
Ambient temperature	Operation:	-10 to +50 °C (T3) -10 to +40 °C (T4)
	Transport and storage:	-20 to +70 °C
Power supply	3 AA (LR 6) batteries, alkaline-manganese For hazardous-area applications: Temperature class T4 (-10 ... +40 °C): Duracell MN1500 Temperature class T3 (-10 ... +50 °C): Energizer E91, Power One 4106, Panasonic Pro Power LR6 See page 5	
Operating time	Approx. 1,000 h ²⁾ , clock operation > 2 years	
Enclosure	Material: PA Type of protection: IP 66, with integrated sensor container	
Dimensions	133 x 160 x 30 mm (W x H x D)	
Weight	Approx. 560 g with batteries	

Specifications for ZU 0244 Printer

Printer type	Matrix printer
Interface	Serial RS 232 interface
Paper	Normal paper, width 57.5 mm (2.25 inches)
Data transfer	Baud rate: 4,800 baud, data bits: 7, stop bits: 1, parity: even
Power supply	230 V AC ± 10 %
Dimensions	197 x 73 x 153 mm (W x H x D)
Weight	Approx. 1.2 kg including plug-in power pack

²⁾ Due to storage, the service life of the included batteries may be shorter.



EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

- (2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**
- (3) EC-type-examination Certificate Number:



PTB 01 ATEX 2161

- (4) Equipment: Battery conductometer Portamess, type 91, X Cond
- (5) Manufacturer: Knick Elektronische Messgeräte GmbH & Co.
- (6) Address: Beuckestr. 22, 14163 Berlin, Germany
- (7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- (8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 01-20449.

- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2

EN 50020:1994

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the equipment shall include the following:



II 2 (1) G EEx ia IIC T4 ... T6

Zertifizierungsstelle Explosionschutz

Braunschweig, January 24, 2002

By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2161**

(15) Description of equipment

The equipment is primarily used for conductivity and temperature measurement in electrochemical and environmental fields.

Pt-1000 or NTC sensors, which may be installed separately or be mounted in the measuring cell, provide for general precise temperature measurements and automatic temperature compensation while the conductivity is measured.

The equipment is used in the potentially explosive atmosphere.

For the relationship between temperature class and the permissible ambient temperature range, reference is made to the following table:

Temperature class	Permissible ambient temperature range
T6	- 10 °C ... 40 °C
T5	- 10 °C ... 40 °C
T4	- 10 °C ... 55 °C

Electrical data

Auxiliary power 3 batteries Varta Universal Alkaline No. 4006,
type Mignon, model LR6-AA-AM3 (alkali-manganese)
or 3 batteries Varta Universal Alkaline No. 8006,
type Mignon, model LR6-AA-AM3 (alkali-manganese)
or 3 batteries Varta Standard No. 3706, type Mignon,
model AA (zinc-chloride)

LF/temperature measuring circuits type of protection Intrinsic Safety EEx ia IIC
(BU 2, 3, 4)

Maximum values:

$U_o = 10 \text{ V}$

$I_o = 88 \text{ mA}$

$P_o = 60 \text{ mW}$

$R_i = 57 \Omega$

$C_i = 50 \text{ nF}$

L_i negligibly low

$C_o = 870 \text{ nF}$

$L_o = 1 \text{ mH}$

sheet 2/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Interface circuits Rx/D, Tx/D $U_{in} = 253 \text{ V}$
(BU 5, 6, 7)

The serial interface may only be used outside the hazardous area.
When the interface is connected to a circuit, neither the equipment nor the pH-temperature measuring circuit may be positioned inside the hazardous area.

(16) Test report PTB Ex 01-20449

(17) Special conditions for safe use

None

(18) Essential health and safety requirements

Met by compliance with the above standards.

Zertifizierungsstelle Explosionsschutz

By order:


Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Braunschweig, January 24, 2002

Statement of ConformityErklärung: Gültigkeit der EG-Baumusterprüfbescheinigung /
Declaration: Validity of the EC-Type-Examination Certificate /
Déclaration: Validité de l'attestation d'examen CE de typeDokument-Nr. / Document No. /
No. document**EB120716B**Produktbezeichnung /
Product identification /
Désignation du produit**Batterie-Konduktometer Portamess Typ 91, X Cond**EG-Baumusterprüfbescheinigung /
EC-Type-Examination Certificate /
Attestation d'examen CE de type**PTB 01 ATEX 2161**

Eine oder mehrere der in der EG-Baumusterprüfbescheinigung **PTB 01 ATEX 2161** genannten Normen wurden durch neue im gültigen Amtsblatt der Europäischen Union aufgeführten Normen oder Normenausgaben ersetzt.

One or more of the standards mentioned in the EC-Type-Examination Certificate **PTB 01 ATEX 2161** have been replaced by new standards or new editions of standards as listed in the Official Journal of the European Union.

Une ou plusieurs des normes citées dans l'attestation d'examen CE de type **PTB 01 ATEX 2161** ont été remplacées par de nouvelles normes ou versions de normes mentionnées dans le Journal officiel de l'Union européenne en vigueur.

Wr, de / We, / Nous,

**Knick Elektronische Messgeräte GmbH & Co. KG
Beuckestr. 22, D-14163 Berlin**

erklären hiermit, auf Grund eines Normenvergleiches dokumentiert in **CL120716A**, für das o. g. Produkt die Übereinstimmung mit den im gültigen Amtsblatt der Europäischen Union aufgeführten harmonisierten Normen oder Normenausgaben.

herewith declare, on the basis of a comparison of standards as documented in **CL120716A**, that the above-mentioned product complies with the harmonised standards or editions of standards listed in the Official Journal of the European Union.

déclarons par la présente, sur la base d'une comparaison des normes qui est documentée dans **CL120716A**, que le produit mentionné ci-dessus est conforme aux normes ou versions de normes harmonisées spécifiées dans le Journal officiel de l'Union européenne en vigueur.

Die angewandten harmonisierten Normen oder Normenausgaben sind in der EG-Konformitätserklärung aufgeführt.
The applied harmonised standards or editions of standards are shown in the EC Declaration of Conformity.

Les normes ou versions de normes harmonisées appliquées sont énumérées dans la déclaration de conformité CE.

EG-Konformitätserklärung /
EC Declaration of Conformity /
Déclaration de Conformité CE**EG120716C**

Das o. g. Produkt stimmt weiterhin mit den Forderungen der Richtlinie 94/9/EG überein.

The above-mentioned product continues to meet the requirements of Directive 94/9/EC.

Le produit mentionné ci-dessus est toujours en conformité avec les exigences de la directive 94/9/CE.

Die o. g. EG-Baumusterprüfbescheinigung ist weiterhin gültig.

The above-mentioned EC-Type-Examination Certificate remains valid.

L'attestation d'examen CE de type ci-dessus reste valable.

Ausstellungsort, -datum /
Place and date of issue /
Lieu et date d'émission**Berlin, 18.07.2012****Knick Elektronische Messgeräte GmbH & Co. KG****Jürgen Cammin**Entwicklung Produktsicherheit • Zulassungen
Development Safety • Approvals

Knick >

Knick
Elektronische Messgeräte
GmbH & Co. KG
Beuckestr. 22
D-14163 Berlin

**EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE**

Dokument-Nr. / Document No. /
No. document

EG129716D

Aufzeichnung / Keyping / Copie en keytr.
Jürgen Cammin (KB)

Wir, die / We, / Nous,

**Knick Elektronische Messgeräte GmbH & Co. KG
Beuckestr. 22, D-14163 Berlin**

Produktbezeichnung /
Product identification /
Désignation du produit

**Batterie-Konduktometer Portamesse® 911 Cond,
913 Cond**

auf welche(n) sich diese Erklärung bezieht, mit allen wesentlichen Anforderungen der folgenden Richtlinien des Rates übereinstimmen.
to which this declaration relates is/are in conformity with all essential requirements of the Council Directives relating to:
auxquelles/auxquels se réfère cette déclaration est/est conforme(s) aux exigences essentielles de la Directives du Conseil relatives à: *)

EMV-Richtlinie / EMC directive /
Directive CEM

2004/108/EG

Norm / Standard / Norme

EN 61326-1: 2006
EN 61326-2-3: 2006

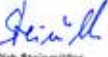
*) Die Sicherheitsmerkmale der mitgelieferten Produktliteratur sind zu beachten. Bei einer mit dem Hersteller nicht abgestimmten Änderung des Gerätes und/oder bei Nichtbeachtung der Sicherheitsmerkmale verliert diese Erklärung ihre Gültigkeit.
The safety instructions contained in the documentation accompanying the product have to be observed. If the apparatus is modified without obtaining manufacturer's prior consent and/or the safety instructions are not followed, this declaration becomes void.
*) Il est impératif de respecter les instructions de sécurité dans la documentation fournie avec le produit. En cas de modification de l'appareil sans l'accord du fabricant et/ou en cas de non-respect des instructions de sécurité, cette déclaration perd sa validité.

Ausstellungsort, -datum /
Place and date of issue /
Lieu et date d'émission

Berlin, 18.07.2012

Knick Elektronische Messgeräte GmbH & Co. KG


Wolfgang Feucht
Geschäftsführer
Managing Director


ppa
Dr. Dirk Steinmüller
Leiter Marketing und Vertrieb
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Knick >

Knick
Elektronische Messgeräte
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**EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE**

Dokument-Nr. / Document No. /
No. document

EG120718C

Aufzeichnung / Keyping / Gede en beeld
Jürgen Cammin (KB)

Wir, die / We. / Nous,

**Knick Elektronische Messgeräte GmbH & Co. KG
Beuckestr. 22, D-14163 Berlin**

erklären in alleiniger Verantwortung, daß dieses Produkt / diese Produkte,
declare under our sole responsibility that the product / products,
déclarons sous notre seule responsabilité que le produit / les produits,

Produktbezeichnung /
Product identification /
Désignation du produit

**Batterie-Konduktometer Portamesse® 911 X Cond,
913 X Cond**

auf welche(x) sich diese Erklärung bezieht, mit allen wesentlichen Anforderungen der folgenden Richtlinien des Rates übereinstimmen;
to which this declaration relates to/are in conformity with all essential requirements of the Council Directives relating to:
auquel/auxquels se réfère cette déclaration est/sont conforme(s) aux exigences essentielles de la Directives du Conseil relatives à: *)

ATEX Richtlinie / ATEX directive /
Directive ATEX

94/9/EG

EG-Bauchstuhlprüfbescheinigung / EC Type-Examination Certificate /
Attestation d'examen CE de type

Harmonisierte Normen /
Harmonised Standards /
Normes harmonisées

EN 60079-0: 2009
EN 60079-11: 2007
EN 60079-28: 2007

**Physikalisch-Technische Bundesanstalt,
D-38116 Braunschweig, ExNB-No. 0102
PTB 01 ATEX 2161**

Benennung / Designation / Marque

CE 0044 II 2 (1) G Ex Ia IIC T3/T4 Ga

Konformitätsausweis / Statement of Conformity / Attestation de conformité

**Knick
Elektronische Messgeräte GmbH & Co. KG,
Beuckestr. 22, D-14163 Berlin
EB120718B**

EMV-Richtlinie / EMC directive /
Directive CEM

2004/108/EG

Norm / Standard / Norme

EN 61326-1: 2006
EN 61326-2-3: 2006

*) Die Sicherheitsanweisungen der mitgelieferten Produktdokumentation sind zu beachten. Bei einer mit dem Hersteller nicht abgestimmten Änderung des Gerätes und/oder bei Nichtbeachtung der Sicherheitsanweisungen verliert diese Erklärung ihre Gültigkeit.
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Ausstellungsort, -datum /
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Berlin, 18.07.2012

Knick Elektronische Messgeräte GmbH & Co. KG



Wolfgang Feucht
Geschäftsführer
Managing Director



Dr.
Dr. Dirk Steinmüller
Leiter Marketing und Vertrieb
Head of Marketing and Sales

Glossary

Automatic switch-off (AutOFF)	To protect the batteries, the meter switches off automatically when not operated for a longer period. Switch-off can take place after either one hour or twelve hours. When data logger or remote interface are active, the auto switch-off feature is disabled.
cal	Key for activating calibration.
Calibration	Adjustment of the conductivity meter to the cell constant of the sensor used.
Calibration solution	Solution with exactly defined conductivity for calibrating a conductivity meter.
Data logger	The data logger records up to 100 measured values together with the temperature, date and time in the data memory. Recording takes place either interval or event-controlled (measured-value difference) or manually at the push of a button.
Data memory	Up to 100 measured values can be stored in the data memory together with the temperature, time and date.
Evaporation residue	See TDS.
GLP	Good Laboratory Practice: Rules for conducting and documenting measurements in the laboratory.
meas	Pressing this key returns to the measuring mode from all other levels. In the Cond measuring mode, the set temperature compensation is displayed by pressing meas , in the TDS mode, the TDS factor is displayed.
NAMUR	German committee for measurement and control standards in the chemical industry

nLF	Non-linear temperature compensation for ultrapure water with NaCl traces and for natural water to EN 27088, reference temperature = 25 °C. Note: With SE 202 sensor and flow-through cell, the resolution is 0.01 $\mu\text{S}/\text{cm}$ – ideal for measurement of ultrapure water.
Response time	Time from the start of a calibration step to the stabilization of the measured value.
Salinity	The salinity indicates the salt content, particularly of sea waters as a cumulative parameter. It is specified in g/kg (‰).
TDS	Total Dissolved Solids, corresponds to the concentration of the dissolved solids contributing to the conductivity – comparable to the evaporation residue.

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